

Feinstein (US 4,572,203) in view of Uhlendorf et al (US 5,678,553); Claims 3, 11, 13 and 50 were rejected under 35 USC §103(a) as being unpatentable over Feinstein in view of Uhlendorf et al as applied to Claim 1 above, and further in view of Deitrich (US 5,482,046); Claims 40/(29, 31-33, 38-39) and Claims 44, and 63 were rejected under 35 USC §103(a) as being unpatentable over Feinstein in view of Uhlendorf et al as applied to claims above, and further in view of Monaghan (US 5,255,683); Claims 8-9, 19-20, 30, 34-37, 40/(30, 34-37) and 51-52 were objected to as being dependent upon a rejected base claim, but would be allowable if written in independent form including all of the limitations of the base claim and any intervening claims; and Claims 41-43, 45-49, 56-59, 62 and 67-68 were allowed.

First, Applicants acknowledge with appreciation the allowance of Claims 41-43, 45-49, 56-59, 62 and 67-68.

Next, the above changes to the specification correct minor informalities uncovered during review of the specification in preparation of the present amendment. No new matter has been added.

In order to clarify the claimed invention, Claim 1 have been amended to state that the said displaying means displays a motion image of the ultrasonic shadowing agent flow produced by the first power ultrasound, with the displayed motion image being reset by breaking of the implanted bubbles of the shadow agent upon application of ultrasound of the second power. Similar motion image "reset" limitations have been added to Claims 14, 24, 27, 29, 50, 54-55, 60 and 64- 66. Thus, the claims so amended state displaying the ultrasound shadowing agent flow with the automatic reset, or generating corresponding data with automatic reset, whereby a doctor can easily visualize the ultrasound shadowing agent flow state. None of the prior art references of record are believed to disclose this claimed feature, and thus all the pending claims are believed to be patentably distinguishing over the

art of record. Accordingly, Claims 1-40, 50, 54-55, 60 and 64-66 are also believed to be allowable.

Claim 44 has been amended to further recite a limitation stated in canceled Claim 46 that the processor is also configured -- to generate a subfraction image by subtracting between the data of plural images--. This limitation is believed to be patentably distinguishing and therefore Claim 44 is also believed to be allowable.

Claims 51 and 65 has been amended to include the features of (1) repeatedly changing ultrasound between high power and low power, and (2) forming the time density curve from the echo signals produced in plural low power scanning periods. By using the echo signals produced in plural periods to form the time density curve, for example, averaging echo signals in different periods, the accuracy of the time density is improved. In view of these features added to Claims 51 and 65, Claims 51-52 and 65 are believed to be allowable.

Claims 61 and 63 have been amended to include the "image subtraction" limitation added to Claim 44 and formerly stated in Claim 46, and further to recite that the application of high power drive pulses is begun by means of a trigger signal, i.e., produced manually¹ or in response to an electro-cardiographic wave,² applied to an input of the "applying means." Accordingly, amended Claims 61 and 63 are directed to an apparatus which performs scanning by high power ultrasound started either manually or in response to an electro-cardiographic wave, followed by data acquisition for plural images, wherein the scanning by high power ultrasound is automatically ended. Accordingly, in view of the changes to Claims 61 and 63, these claims are also believed to be allowable.

¹Specification, page 7, lines 34-38.

²Id., page 8, lines 4-6.

New Claim 69 recites an ultrasound apparatus including a transducer configured to transmit in response to a drive pulse an ultrasound signal to a human body having implanted bubbles and to generate an echo signal corresponding to an ultrasound echo from the human body; a transmission mechanism configured to apply to said transducer repeatedly a series of first drive pulses to cause said transducer to transmit corresponding ultrasound signals to break the bubbles; said transmission mechanism having an input configured to receive a trigger signal so that transmission of the first drive pulses transmission is started by the trigger signal and ended a first time period after the trigger signal, the trigger signal being produced manually or in response to an electro-cardiographic wave; and a processor configured to generate data of plural images based on echo signals generated by said transducer in response to the series of said first drive pulses. Thus, Claim 69 includes the feature of repeated application of drive pulses and transmission of corresponding ultrasound signals to break the implanted bubbles, in response to a manually produced trigger signal or a trigger signal generated in response to an electro-cardiographic wave. The stated features of new Claim 69 are also believed to be allowable.

New Claim 70 corresponds to allowed Claim 62, and further recites the “image subtraction” feature added to Claim 44 and formerly recited in Claim 46 and the “trigger signal” (either manual or electro-cardiographic wave generated) recited in Claim 69. Claim 70 is therefore also believed allowable.

None of the amended or newly submitted claims is believed to raise a question of new matter. Further, while it is acknowledged that a supplemental reissue declaration is necessitated by the present amendment, it is respectfully requested that the requirement for a supplemental reissue declaration be held in abeyance until all claims are indicated as allowable.

Consequently, in view of the present amendment, each of the pending claims is believed to be allowable, and the present application is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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*Transmittal
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